



Date of Application and filing Complete Specification March 16, 1949.

No. 7225/49.

Application made in United States of America on Nov. 26, 1948.

Complete Specification Published Nov. 28, 1951.

Index at acceptance:—Class 103(i), E2n1.

# COMPLETE SPECIFICATION Wheel and Brake Combination

We, WINGFOOT CORPORATION, a corporation organized under the laws of the State of Delaware, United States of America, of 1144 East Market Street, Akron, Ohio, United States of America, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to wheel and brake combinations, and, more particularly, is concerned with a brake contained substantially within the confines of an associated wheel and capable of absorbing large amounts of kinetic energy.

It is the general object of the invention to provide a new and useful wheel and brake combination wherein the brake is contained substantially within the confines of a wheel, but is capable of absorbing large amounts of kinetic energy.

Another object of the invention is the provision of a combination of the type described which is characterized by relatively light weight, so that it may be used on airplanes, which has high energy absorbing abilities so as to stop a heavy airplane within relatively short distances, and which is strong and durable and will operate over long periods with a minimum of attention and repair.

Another object of the invention is the provision of a brake and wheel assembly characterized by simplicity and inexpensiveness, and including hydraulically operated energizing means, the entire brake assembly being contained inside the wheel substantially within the confines of the sides of the wheel.

The foregoing objects of the invention, and other objects which will become apparent as the description proceeds, are achieved by the provision of a brake and wheel structure including a stationary axle, circular inboard and outboard flanges secured to the axle, bearings supported on the peripheries of the flanges, a divided wheel adapted to removably receive a tire and rotatably supported on

the bearings, clamping lugs positioned at circumferentially-spaced points around the inside periphery of the wheel to releasably clamp the wheel parts together, brake discs positioned between the flanges and having keyed driving engagement with the clamping lugs, a spider positioned between one of the flanges and a brake disc and slidably keyed to the axle, a second spider positioned between the brake discs and slidably keyed to the axle, blocks of friction material carried by the arms of the several spiders and by the other flange and adapted to engage with the brake discs, and hydraulically-operated means carried by the said one flange for moving the friction material against the brake discs.

For a better understanding of the invention, reference should be had to the accompanying drawings wherein:—

Fig. 1 is a side elevation, partially broken away, of a wheel and brake assembly incorporating the principles of the invention; and

Fig. 2 is a vertical cross-sectional view of the wheel and brake assembly of Fig. 1 as taken substantially on line II—II thereof.

In the drawings, the numeral 1 indicates a stationary axle which has secured to its inboard and outboard sides substantially circular flanges 2 and 3. In the particular embodiment of the invention, this is achieved by forming the flange 2 with a hub portion 4 which extends slidably over the axle 1, with the hub portion 4 acting as a spacer between the flanges 2 and 3. To prevent rotary movement between the flanges 2 and 3, and the axle 1, the flange 2 may be bolted, as by bolts 5, to a torque flange 6 fastened to the axle 1, and in addition, circumferentially-spaced tongue and groove connections 7 are provided between the inner periphery of one edge of the flange 3 and the end of the hub 4. Furthermore, the other side of the inner periphery of the flange 3 is formed with a plurality of tongue and groove connections 8 with the end of the

wardly, the shoulder 46 picks up the spacer sleeve 45 and moves it towards the plate 39 compressing the spring 47. Ordinarily, the clearance between the end 5 of the spacer sleeve 45 and the plate 39 is sufficient to allow the application of the braking pressure to the brake discs. However, as the blocks of friction material become worn, then the piston 38 will have 10 to move outwardly farther to effect the braking pressure and the end of the spacer sleeve 45 will engage with the plate 39 and the pressure on the plate will be much as to overcome the frictional resistance of 15 the packing 43 on the stem 40, and the plate 39 will be moved outwardly of the boss 42 to a new position. When this occurs, the return movement of the piston 38 into the cylinder 37 will not be so great 20 inasmuch as the piston will strike the repositioned plate 39 sooner. In this way, the travel of the pistons 38 to effect braking pressures on the brake discs is always substantially the same regardless of the 25 degree of wear on the blocks of friction material.

It will be understood that all three of the hydraulic cylinders positioned at circumferentially spaced points around the 30 flange 2 operate in a similar manner, and operate simultaneously. The simultaneous operation of the several hydraulic cylinders is achieved by connecting the cylinders together for simultaneous operation 35 by means of conduits 51 and 52.

From the foregoing, it will be recognized that the various objects of the invention have been achieved by the provision of a relatively light weight, but strong 40 and durable wheel and brake assembly characterized by compactness of the brake unit which is positioned substantially within the confines of the wheel. The brake unit has high energy absorbing 45 capacity and is long wearing and durable substantially without maintenance or repair.

While certain representative embodiments and details have been shown for the 50 purpose of illustrating the invention, it will be apparent to those skilled in this art that various changes and modifications may be made therein without departing from the scope of the invention.

55 What we claim is:—

1. A self-contained combination brake and wheel of the type mounting directly upon a fixed axle, characterized in that a 60 divided wheel adapted to directly mount a pneumatic tire is provided with lugs spaced circumferentially of the inner periphery of the wheel and adapted to removably clamp the wheel together, a plurality of brake discs are slidably keyed to the

lugs for rotary movement with the wheel, 65 all these elements are mounted upon the axle *via* the intermediary of circular flanges or the like, which last are immovably affixed to the axle and around which the said wheel rotates, and there 70 are associated with the said flanges arrangements for frictionally clamping them against the said brake discs.

2. A brake and wheel as claimed in Claim 1, characterized in that the said 75 brake discs and the said flanges are of substantially equal external diameter.

3. A brake and wheel as claimed in Claim 1 or 2, characterized in that the said flanges are affixed to the axle at 80 spaced points thereon, the inner portion of the wheel has a width substantially equal to the distance between the flanges, the flanges carry bearings rotatably supporting the wheel by engagement therewith 85 substantially beneath the opposed edges thereof, said frictionally clamping arrangements include alternately-positioned second brake discs slidably keyed 90 to the axle, and one of the said flanges carries mechanism for compressing all the discs together and against the other flange.

4. A brake and wheel as claimed in Claims 1 and 3, characterized in that the said second brake discs keyed to the axle 95 carry blocks of friction material positioned between the two sets of brake discs.

5. A brake and wheel as claimed in Claim 4, characterized in that an additional block of friction material is carried 100 by the circular flange not carrying the compression mechanism, in a position adjacent one of the first brake discs keyed to the wheel.

6. A brake and wheel as claimed in 105 any of Claims 3 to 5, characterized in that the compression mechanism is hydraulically actuated.

7. A brake and wheel as claimed in any of Claims 4 to 6, characterized in that the 110 said hydraulic compression mechanism includes a plurality of hydraulically-actuated pistons carried on the flange in alignment with the blocks of friction material at circumferentially-spaced 115 points, and mechanisms are provided for simultaneously actuating the pistons to apply the brake.

8. A brake and wheel as claimed in any of the foregoing claims, characterized 120 in that the brake discs keyed to the axle are of spider form.

9. A brake and wheel as claimed in Claim 1, substantially as described with 125 reference to the accompanying drawings.

Dated this 16th day of March, 1949.  
MARKS & CLERK.

*This Drawing is a reproduction of the Original on a reduced scale*

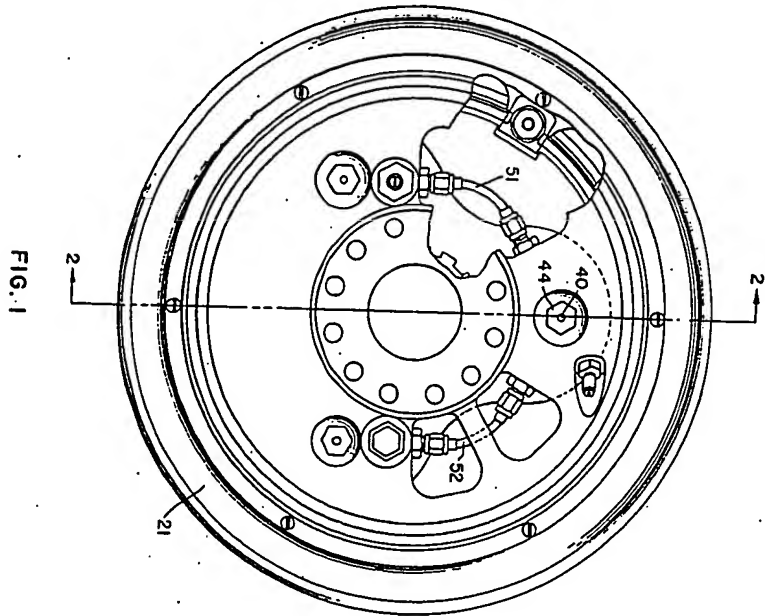


FIG. 1

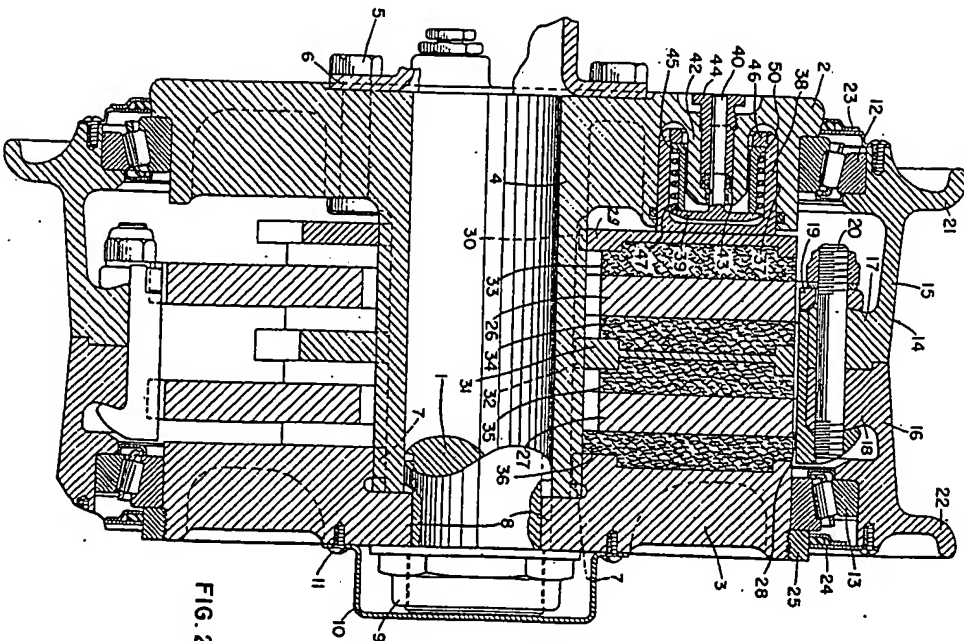


FIG. 2